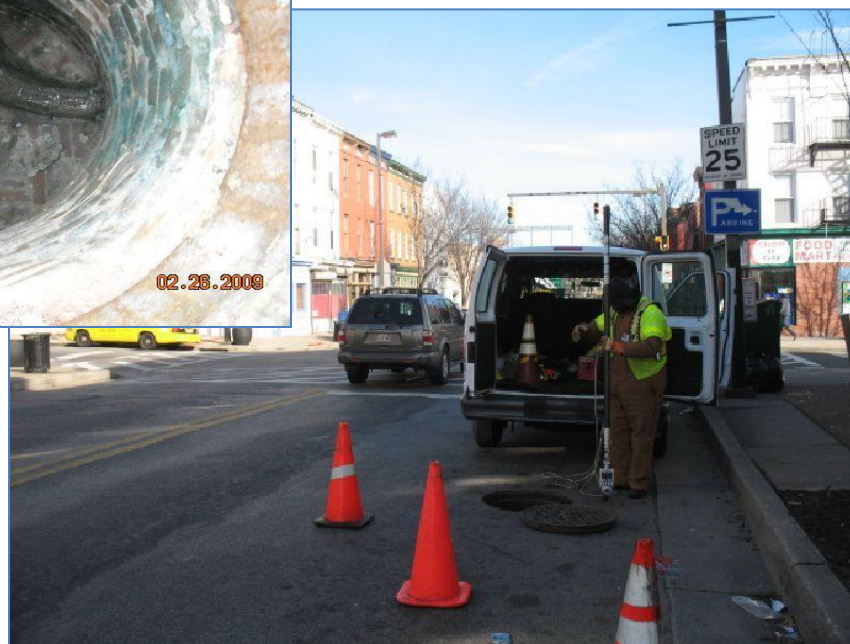


# MANHOLE INSPECTION PROGRAM FOR THE LOW LEVEL SEWERSHED

CITY OF BALTIMORE PROJECT NO. 1029



## MANHOLE DEFECT MANUAL

### LOW LEVEL COLLECTION SYSTEM EVALUATION AND SEWERSHED PLAN CITY OF BALTIMORE PROJECT 1029

PREPARED BY

H&S / PHR+A / HMM  
JOINT VENTURE  
BALTIMORE, MD

*Jul-09*

**HAZEN AND SAWYER**  
Environmental Engineers & Scientists

**PHR+A**



**Hatch Mott  
MacDonald**

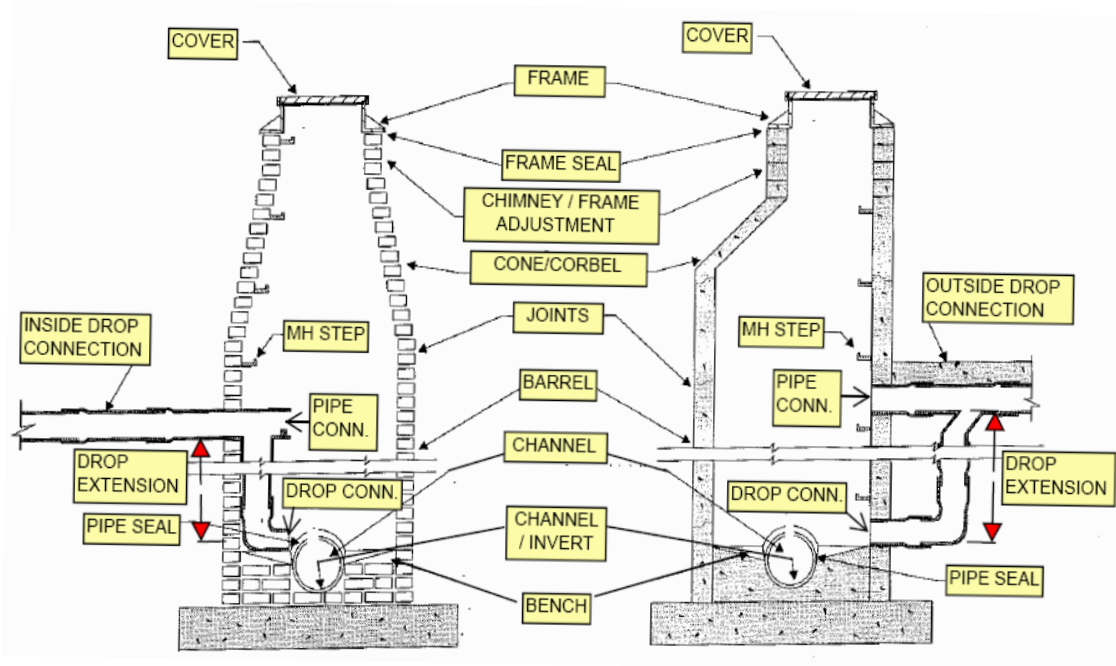
**MANHOLE INSPECTION TERMS FOR THE LOW LEVEL SEWERSHED****OVERVIEW**

The information provided in this manual should be used for the collection, evaluation and review of all data obtained as part of the Low Level Collection System Evaluation and Sewershed Plan's Manhole Inspection Program - City of Baltimore Project Number 1029. This information is not intended to account or accommodate all situations or circumstances encountered; rather, it provides the user with general terminology, inspection guidelines for recording and evaluating manhole related data and defects required as part of this project. Should the user encounter specific data that requires further evaluation, please consult Colleen Block.

# MANHOLE INSPECTION TERMS FOR THE LOW LEVEL SEWERSHED

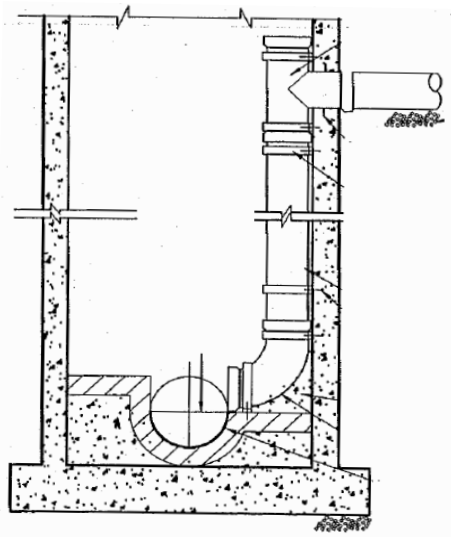
The Following MH Components Shall Be Used When Documenting Manhole Structures In The Low Level Sewershed

## TYPICAL MANHOLE COMPONENTS

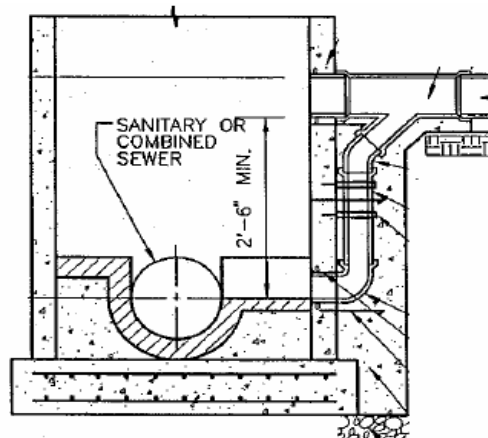


TYPICAL BRICK MANHOLE

TYPICAL PRECAST MANHOLE



TYPICAL INSIDE DROP CONNECTION

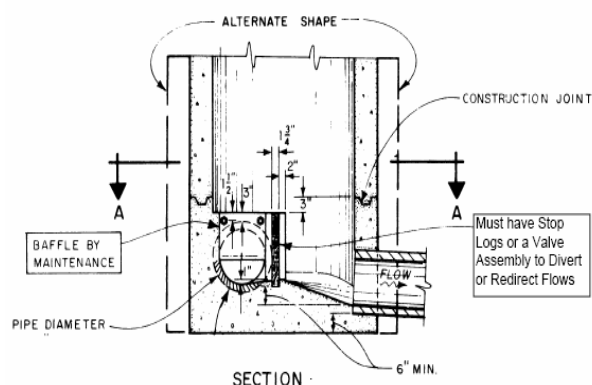


TYPICAL OUTSIDE DROP CONNECTION

## MANHOLE INSPECTION TERMS FOR THE LOW LEVEL SEWERSHED

The Following Structure Types Shall Be Used When Documenting Manhole Structures In The Low Level Sewershed

### MANHOLE TYPES



#### Diversion Manhole

MH Must Contain A Mechanical Feature To Diver Or Redirect Flow

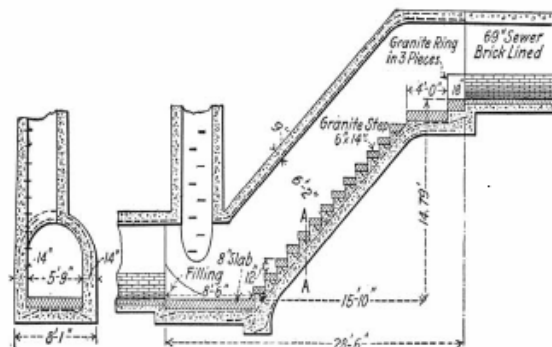


FIG. 35. Flight Sewer at Baltimore.

#### Flight Sewer Manhole

MH Located Before Or After A Steep Drop In Sewer As Shown Above



#### Inline Manhole

Can Only Have (1) Influent Pipe And (1) Effluent Pipe



#### Junction Manhole

MH Must Have Multiple Pipes And/Or Size Pipes Entering The MH



#### Off-Set (Type 1) Manhole



#### Off-Set (Type 2) Manhole



# MANHOLE INSPECTION TERMS FOR THE LOW LEVEL SEWERSHED

## MANHOLE TYPES



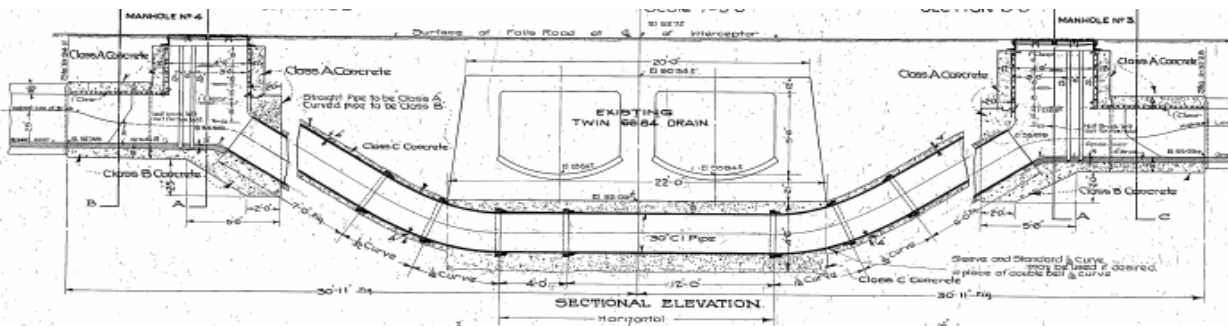
### Overflow Manhole

MH will Have Elevated Overflow Pipe  
(May Have Flap Type Valve)



### Siphon Manhole (Chamber)

Typically A Chamber From A Large Diameter  
Sewer Leading Two Or More Smaller Diameter  
Siphon Pipes (See Siphon Detail Below)



Sewer Siphon w/ Chambers



### Terminal Manhole

MH Cannot Have Any Connections  
(Including House or Service Connection)

## MANHOLE INSPECTION TERMS FOR THE LOW LEVEL SEWERSHED

The Following Criteria Shall Be Used When Documenting Defects in Manhole Structures In The Low Level Sewershed

### INFLOW AND/OR INFILTRATION

**Inflow:** Water Entering A MH From The Ground's Surface Via Runoff Or By Direct Connections.

Evidence Of Inflow (Leakage Around Frame & Cover)

Significant Signs of Inflow (Leakage Around Frame And Cover)

**Infiltration:** Water Entering The MH From Below The Ground's Surface

Evidence Of Infiltration (Wall Staining, Calcification, Etc.)

Evidence Of Multi-Point Infiltration (Staining) Or Active Infiltration

Active Infiltration

#### INFLOW:



Photo Shows Surface Water Inflow Into MH



Frame Leak Staining In Adjustment Section

#### INFILTRATION:



Infiltration At The Frame Adjustment Section



Infiltration Staining On MH Wall



Multi-Point Infiltration Staining On MH Wall



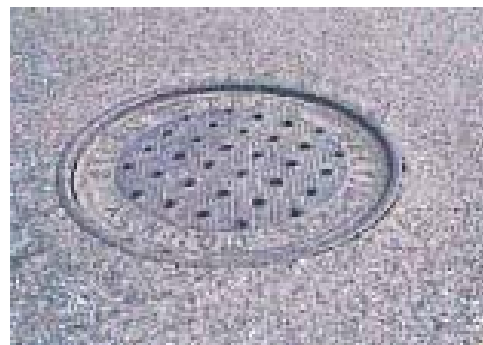
Active Infiltration Leak At MH Joint

**MANHOLE INSPECTION TERMS FOR THE LOW LEVEL SEWERSHED**

The Following Criteria Shall Be Used When Documenting Manhole Structures And Defects In The Low Level Sewershed

**COVERS**

**Bolted Manhole Cover**



**Vented Manhole Cover**



**Water Tight (WT) Manhole Cover**



**Water Tight Manhole Insert**



**Sheeting Flow**



**Ponding Of MH**



**Inundated MH**



# MANHOLE INSPECTION TERMS FOR THE LOW LEVEL SEWERSHED

The Following Criteria Shall Be Used When Documenting Manhole Structures In The Low Level Sewershed

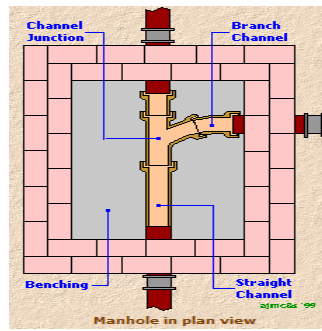
## MANHOLE SHAPES



**Circular Manhole**



**"D" Shaped Manhole**



**Rectangular Manhole**



**Bench Exists**



**No Bench Exists**



**Channel "Fully Open"**



**Channel "Partially Open"**

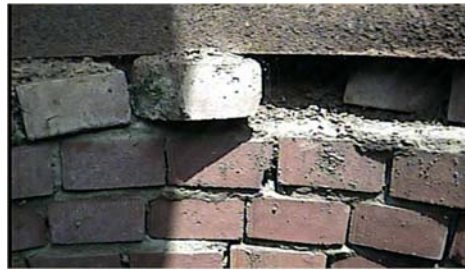


**Channel "Closed"**



**MANHOLE INSPECTION TERMS FOR THE LOW LEVEL SEWERSHED**

The Following Criteria Shall Be Used When Documenting Defects In Manhole Structures In The Low Level Sewershed

**DEFECTS****Cracks****Root Intrusion****Loose Bricks****Missing Bricks****Deterioration****Leaks/Infiltration****Evidence Of Surge****Surcharged Manhole****Debris****Corroded Steps**